Contribution of the new DORIS/DGXX instruments to the geodetic products: First results with Cryosat-2

L. Soudarin\textsuperscript{1}, H. Capdeville\textsuperscript{1}, J.-M. Lemoine\textsuperscript{2}

\textsuperscript{1} CLS, Collecte Localisation Satellites, Ramonville, France
\textsuperscript{2} CNES, Toulouse, France
The DORIS constellation

3 generations of DORIS instruments
- 1G (Spot-2,-3,-4, Topex) : 1 channel
- 2G (Envisat) and 2GM (Spot-5, Jason-1) : 2 channels
- DGXX (Jason-2, Cryosat-2) : 7 channels

3 altitudes
- Spot -2,-3,-4,-5 / Envisat: around 800 km
- Topex / Jason-1/ Jason-2 : 1330 km
- Cryosat-2 : 710 km

3 orbit planes

<table>
<thead>
<tr>
<th>Year</th>
<th>SPOT/ENVISAT</th>
<th>TOPEX/JASON</th>
<th>CRYOSAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-2004</td>
<td>Spot-2,-3/-4,-5; Envisat</td>
<td>Topex</td>
<td>-</td>
</tr>
<tr>
<td>2005-2008</td>
<td>Spot-2,-4,-5; Envisat</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2008-2009</td>
<td>Spot-2,-4,-5; Envisat</td>
<td>Jason2</td>
<td></td>
</tr>
<tr>
<td>2010-</td>
<td>Spot-4,-5; Envisat</td>
<td>Jason2</td>
<td>Cryosat2</td>
</tr>
</tbody>
</table>
Visibility circles (12 deg.)

Cryosat-2's contribution

JASONs Topex

SPOTs

Envisat

Cryosat2

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
Orbit residuals

Cut-off 12 deg.

Spot4 0.39 mm/s
Spot5 0.36 mm/s
Jason2 0.32 mm/s
Cryosat-2 0.36 mm/s
Envisat 0.38 mm/s

1.5 cm
1.5 cm
1 cm
1 cm

DORIS/Cryosat2: ~8000 validated data per day as for Spot-5 and Envisat
SINGLE SATELLITE SOLUTIONS
Topex

Comparison of weekly solutions wrt DPOD2005
Residual 3D-rms obtained after 7P transformations

Peaks:
- incomplete weeks (data gap)
- solar events (geomagnetic storms)
Cryosat-2's contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
SPOT-5
Cryosat-2’s contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
Cryosat-2's contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
Cryosat-2's contribution
All satellites & Combination including ja2
Cryosat-2’s contribution

Latitude

Cryosat2
Longitude

Cryosat-2's contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
Verticale

Cryosat-2's contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
CONTRIBUTION OF CRYOSAT-2 TO THE COMBINATION (FIRST RESULTS)
Weekly 3D RMS

Weekly DORIS solutions wrt DPOD2005

Cryosat-2’s contribution

IDS Workshop, 21-22 October 2010 Lisbon, Portugal
Weekly Up RMS

![Weekly Up RMS Graph](image-url)
**Contribution of ja2 and cs2 for station positioning**

ja2 + cs2 vs spot+env
ja2+cs2: 2 orbital planes / 2 altitudes / DGXX
spot+env: 1 orbital plane / 1 altitude / 1G, 2G

ja2+cs2 better than spot+env
ja2+cs2 better than spot+env+ja2 for East component

spot+env+ja2+cs2 vs spot+envisat

gain in north (3-5 mm), east (>5mm), vertical (5 mm)
EOP weekly Std Dev (wrt EOP05C04)

ja2+cs2

spots+env

spots+env+ja2

spots+env+ja2+cs2

Cryosat-2's contribution
THANK YOU